Due Date: April 7, 2008

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	)	
Inventor: Marc Bolduc et al.	)	Examiner: Hussein A. El Chanti
Serial #: 09/928,598	)	Group Art Unit: 2157
Filed: August 13, 2001	)	Appeal No.: _________
Title: DISPLAYING IMAGE DATA	)	

REPLY BRIEF OF APPELLANTS

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I. INTRODUCTION

In accordance with 37 C.F.R. §41.41, Appellants' attorney hereby submits the Reply Brief of Appellants in response to the Examiner's Answer dated February 6, 2008.

No fee is required for filing this Reply Brief. However, the Office is authorized to charge any necessary fees or credit any overpayments to Deposit Account No. 50-0494 of Gates & Cooper LLP.

II. ARGUMENTS

In the Answer, the Examiner essentially reiterates the prior rejections, but also includes new arguments using somewhat different citations to the reference. In this regard, this Reply Brief of Appellants incorporates by reference herein the entirety of the previously filed Brief of the Appellants. Moreover, additional arguments are also presented below.

A. Arguments Directed To The First Grounds for Rejection: Whether Claims 1-30 Are Anticipated Under 35 U.S.C. §102(b) by U.S. Patent No. 5,600,73 (Chui).

1. Independent Claims 1, 8, 11, 18, 21 and 28

The Examiner's Answer again asserts that claims 1-30 are anticipated under 35 U.S.C. §102(b) by U.S. Patent No. 5,600,373 (Chui). Specifically, the Examiner's Answer asserts the following:

> Claims 1-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Chui et al., U.S. Patent No. 5,600,373 (referred to hereafter as Chui).
>
> As to claims 1, 11 and 21, Chui teaches apparatus, method for viewing image data, comprising:
>
> (a) display means "26d" (see col. 29 lines 40-55 and fig. 4a);
>
> (b) network connecting means for transferring frames of said image data over a network from a remotely connected frame source (see 13 lines 27-55), wherein: (i) said image data comprises a plurality of image frames and has a frame rate from which may be inferred a due time for display of each frame in a sequence of frames in said image data (see col. 1 lines 38-48, col. 18 lines 19-48 and col. 28 lines 22-37); (ii) said frame source returns a frame in response to a frame request issued over said network (see col. 29 lines 40-55, the frames are displayed according to a sequence); and
>
> (c) processing means configured to play a clip by:
>
> (i) displaying selected frames from said frame source, on said display means, at their due time by skipping frames in said frame sequence in response to an indication of the data transfer rate of said network so that a loss of the network bandwidth availability results in degradation in smoothness of the clip, not a modification of the rate at which recorded events in the clip unfold (see col. 29 lines 40-55, video is displayed in real time, some frames are skipped).
>
> As to claims 8, 18 and 28, Chui teaches apparatus, method for viewing image data, comprising:
>
> (a) display means (see col. 29 lines 40-55);
>
> (b) network connecting means for transferring frames of said image data over a network from a remotely connected frame source (see 13 lines 27-55),
>
> (c) processing means configured to play a clip by:
>
> (i) selecting a next frame for preloading by skipping at least one frame in the clip's frame sequence in response to an indication of the data transfer rate of said network (see col. 29 lines 45-51),
>
> (ii)preloading a frame from the frame source into a frame queue in said memory means (see col. 29 lines 45-51),
>
> (iii) displaying a preloaded frame at its correct time based on the frame rate in order to maintain timing integrity of the clip (see col. 29 lines 40-55),
>
> (iv) processing elapsed time since the clip started playing with a frame timing parameter (see col. 29 lines 40-55), and
>
> (v) updating the number of frames to skip in response to said processing of elapsed real time (see col. 29 lines 40-55).

In addition, the Office Action states the following:

(10) Response to Argument

Examiner summarizes the various points raised by the appellant and addresses replies individually. The appellant argues that Chui does not disclose "skipping frames on the basis of network bandwidth availability". (see brief page 10, argument A).

In reply to A, Chui teaches a system and method for requesting a video from a source over a network (see fig. 4a and col. 13 lines 15-26) and displaying the requested video in real time (see col. 13 lines 57-67). The network has a variable network bandwidth that may vary between 40 to 80 MHz in which data can be transmitted (see col. 1 lines 38-48). The computer that requested the video also has a decompressor that can decompress the received data over the network at a rate less than 1130 frames per second (see col. 2 lines 41-54, col. 15 lines 55-col. 16 lines 7 and col. 29 lines 40-45).

Essentially, Chui admits that the current technology is not fast enough to transmit and display video data in real-time. The two main limitations in the technology as explained by Chui is 1) network bandwidth limitation not being fast enough to transmit video data over a network and 2) the decompression rate is not fast enough to decompressing the received video data to be displayed. To overcome these limitations, Chui explicitly teaches skipping video packets that were not received fast enough or were not decompressed fast enough and displaying only the packets that were transmitted and decompressed in just enough time to be displayed in real time (see col. 29 lines 40-56). Therefore Chui does teach skipping frames based on a frame rate. The claim language does not specify that the frame rate is a "network bandwidth availability". The frame rate can be broadly interpreted by examiner to be frame decompression rate or even the network bandwidth. In both cases, as explained above, Chui compensates for the shortcoming of the network bandwidth and the frame decompression rate by skipping frames that may not be displayed in real time.

The appellant argues that Chui does not disclose "displaying selected frames from said frame source, on said display means, at their due time by skipping frames in said frame sequence in response to an indication of the data transfer rate of said network so that a loss of the network bandwidth availability results in degradation in smoothness of the clip, not a modification of the rate at which recorded events in the clip unfold" (see brief page 10, argument B).

In reply to B, as explained above, the system has a limitation by having a slow bandwidth which may vary between 40 to 80 MHz (see col. 1 lines 38-47). However regardless of the change in the availability of the network bandwidth, the system taught by Chui skips frames and only displays the frames that can be displayed in real time (see col. 29 lines 40-63) regardless of the available bandwidth. In other words, assuming the available bandwidth initially is at 80 Mhz; also assuming that the system at the initial rate has to drop 1 frame per 5 frames. If the bandwidth drops for example to 60 MHz, then the rate at which the decompressor will drop. The system would then have to adjust by skipping more frames so that the system would only display the frames that may be displayed in real time. Therefore, Chui teaches "displaying selected frames from said frame source, on said display

means, at their due time by skipping frames in said frame sequence in response to an indication of the data transfer rate of said network so that a loss of the network bandwidth availability results in degradation in smoothness of the clip, not a modification of the rate at which recorded events in the clip unfold" as claimed.

The claim language stating "so that a loss of the network bandwidth availability results in degradation in smoothness of the clip, not a modification of the rate at which recorded events in the clip unfold" is a language that recites an intended use and does not provide a structure to achieve the intended use. A recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

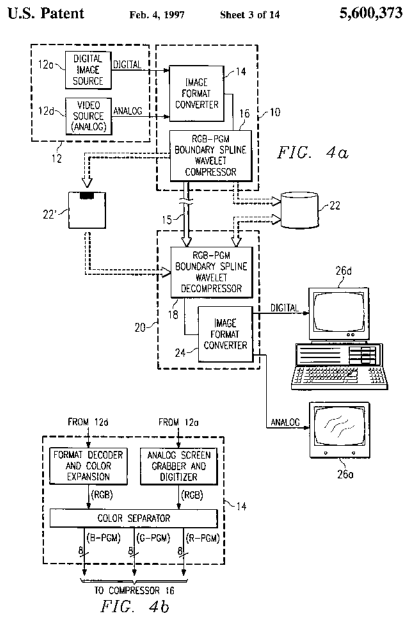
The appellant argues that Chui does not disclose selecting a next frame for preloading by skipping at least one frame in the clip's frame sequence in response to an indication of the data transfer rate of said network, preloading a frame from the frame source into a frame queue in said memory means, displaying a preloaded frame at its correct time based on the frame rate in order to maintain timing integrity of the clip, processing elapsed time since the clip started playing with a frame timing parameter, and updating the number of frames to skip in response to said processing of elapsed real time (see brief page 11, argument C).

In reply to C, Chui teaches that the system is able to determine whether the decompressor is able to decompress the frame and display it in real time. If the decompressor is unable to do so, then the decompressor skips to the next frame in the sequence based in the frame decompression rate and the rate at which the frames are received (see col. 29 lines 45-51). Therefore Chui selects the next frame in the sequence and therefore meets the limitation "selecting a next frame for preloading by skipping at least one frame in the clip's frame sequence in response to an indication of the data transfer rate of said network". The deompressor examines the header of the frame and determines the sequence number of the frame and then displays the frame at its right time by determining the sequence number and the proper time for the frame to be displayed (see col. 29 lines 40-55). Therefore Chui teaches "displaying a preloaded frame at its correct time based on the frame rate in order to maintain timing integrity of the clip, processing elapsed time since the clip started playing with a frame timing parameter, and updating the number of frames to skip in response to said processing of elapsed" as claimed.

Appellants' attorney disagrees with this analysis.

Consider the portions of Chui cited by the Office Action as teaching all the elements of the independent claims 1, 8, 11, 18, 21 and 28, which are set forth below:

Chui: Fig. 4a



Chui: col. 1, lines 38-48

The large amount of digital data necessary to represent a video frame not only impacts computer storage requirements, but limits the rate at which conventional systems can communicate motion pictures. Considering that conventional high-speed digital communication channels have a bandwidth of on the order of from 40 to 80 MHz, it becomes quite apparent that conventional motion pictures of thirty frames per second, with 1500 kbytes of digital information per frame, cannot be fully transmitted in real-time over state of the art digital communications systems.

Chui: col. 2, lines 41-54

While the JPEG conventional video image compression technique is useful in obtaining high degrees of compression, it has been found that JPEG compression is incapable of being used in a real-time fashion for a motion picture. This is because the time generally required to perform the JPEG decompression of a motion picture frame exceeds the display time for the frame (1/30 second), and as a result the motion picture image cannot be decompressed for real-time display. Temporally accurate display of a motion picture compressed according to these techniques, thus requires the decompression and display to be done in two steps, with the decompressed motion picture stored on video tape or another medium from which the motion picture can be played with the proper time base.

Chui: col. 13, lines 27-55

As shown in FIG. 4a, in the context of video data communication, the transmission end of system 8 includes video source 12 and compression system 10,

while the receiving end of system 8 includes decompression system 20 and video display 26. As illustrated in FIG. 4a, video source 12 may include digital video source 12d which may be a conventional device such as a CD-ROM drive, scanner, digital electronic network connection, or similar unit, or alternatively may be a computer storage unit such as a disk that contains digital video information. Video source 12 may also or instead include analog video source 12a, which may be a video camera, VCR unit, television broadcast or cable receiver, or another conventional source of analog video information. In any case, video source 12 provides digital or analog signals indicative of the images to be communicated or stored by the system of FIG. 4a.

Communication network system 15 is a conventional analog transmission or electronic digital communications network, or both an analog and digital network when including the appropriate clusters, analog-to-digital and digital-to-analog converters, and other necessary apparatus. Network 15 may be realized according to any conventional technology, including hard-wired cable, fiber optic cable, broadcast or satellite transmission, and the like. It is further contemplated that network 15 may be implemented merely by the physical transportation of portable media 22' such as floppy diskettes, CD-ROMs and the like. Regardless of the implementation, network 15 is connected between compression system 10 and the input of decompression system 20 to communicate compressed video image data therebetween.

Chui: col. 15, line 55-col. 16, line 7

Similarly, decompression system 20 includes decompressor 18 coupled to network 15 (or to disk 22, as the case may be). Decompressor 18 receives the transmitted or stored image data, reformats it into a form suitable for decompression, if necessary, and decompresses the data. Decompressor 18 in this embodiment of the invention communicates the decompressed image data to format converter 24, which converts the decompressed data to the appropriate format for display by display 26.

As illustrated in FIG. 4a, display 26 may be implemented as a digital display 26d, to which digital data may be directly applied thereto; alternatively, display 26 may be implemented as a conventional analog display, with the appropriate NTSC or other analog video format data applied thereto. According to this example, the output data from decompressor 18 is in PGM or RGB-PGM format, and thus format converter 24 will convert the PGM data into PCX, IMG, GIF, TIF, RLE, NTSC, PAL, RGB, or another display format. Of course, if digital display 26d is used and is capable of receiving and directly displaying PGM format data, format converter 24 is unnecessary.

Chui: col. 18, lines 19-48

This example of compressor 16 is intended to support the compression of high definition real-time true color video image data, where "true color" indicates the use of twenty-four bits of color information for each pixel, resulting in 16.7 million possible colors. The frame rate for compressor 16 is intended to be on the order of thirty frames per second, so as to support "real-time" video image compression.

As noted above, if the color and frame rate requirements are reduced from real-time true color video, it may be possible to implement compressor 16 as a single channel, i.e. with a single channel compression subsystem 29. In this

implementation, color data could be compressed sequentially for the R, G and B components of the RGB-PGM input data, under the control of main controller 28.

3. Boundary-Spline-Wavelet Video Image Data Compression

Referring now to FIG. 6, a method of compressing video image data according to the preferred embodiment of the invention will now be described in detail. It is contemplated that the architecture of compressor 16 of FIG. 5 and described hereinabove is particularly suitable for the performing of this method, although it is further contemplated that other computer architectures and arrangements may alternatively be used to perform the process of FIG. 6.

The flow chart of FIG. 6 corresponds to the compression of a single frame of video image data. Accordingly, for the compression of a motion picture, the process of FIG. 6 is performed sequentially for each frame of the motion picture. In the case of still image compression, of course, the process of FIG. 6 is performed for each image.

<u>Chui: Col. 28, lines 22-43</u>

Fields 74 and 75 then follow in frame 70 according to this example, to facilitate control of the display of the video sequence containing frame 70. Field 74 is a four-byte field of long integer type which contains the address at which the previous frame in the sequence begins, enabling rapid jumping back to the previous frame as desired. As will be described hereinbelow, a user control interface may be provided with decompressor system 20 to allow interactive control of the display of the video sequence, in which case field 74 will facilitate the skipping and selection of individual frames in reverse order. Similarly, field 75 is a four-byte field of long integer type which contains the address of the next frame in the sequence, allowing rapid skipping of frames 70 in the forward direction during decompression and display.

Field 76 is a two-byte field of integer type that indicates the complexity of the image contained within frame 70, by specification of compression ratio, quality index, or a user-defined specification of the image, such values useful in measuring and controlling the performance of the decompression and display.

<u>Chui: Col. 29, lines 40-63</u>

This arrangement of frame 70 is particularly useful in the interactive decompression and display of a sequence of video frames. Specifically, fields 74, 75 and 76 enable decompressor 20 to flexibly display the frames in the sequence, especially in the case where the sequence of frames 70 are sequential frames in a motion picture. For example, decompressor 20 can interrogate field 76 to determine if the processing capacity of decompressor 20 and its display system 26 is such that every frame in the sequence cannot be decompressed and displayed in real time; if so, decompressor 20 can skip to the next frame 70 in the sequence indicated by the contents of field 75 in frame 70. While the quality of the displayed motion picture will be reduced from the best possible images when frames are skipped, those frames that are not skipped are displayed in real-time, so that the time-dependence of the motion in the motion picture is accurately conveyed.

Fields 74, 75, 76 also provide interactive display capability. As field 74 indicates the address of the previous frame in the sequence, frame 70 allows the capability of backwards display of a motion picture, whether for each frame 70 in the

> sequence or with frames skipped as described above based on the time required for decompression and the capability of decompressor 18. In addition, the information provided by field 76 facilitates the synchronization of the display of the sequence of frames 70, and also allows for easy scaling of the time base to provide slow-motion or enhanced-speed display.

Appellants' attorney respectfully submits that the above portions of Chui merely describe a decompressor interrogating a field in a frame that indicates the complexity of the image contained within the frame to determine if the processing capacity of decompressor and its display system is such that every frame in the sequence cannot be decompressed and displayed in real time, and then skipping to a previous or next frame in the sequence.

However, nothing in the above portions of Chui teach or suggest skipping frames on the basis of network bandwidth availability.

Specifically, Chui does not teach or suggest the limitations of Appellants' independent claims 1, 11 and 21 directed to displaying selected frames from a frame source on a display means, at their correct time based on the frame rate in order to maintain timing integrity of the clip by skipping frames in a frame sequence in response to an indication of the data transfer rate of a network, so that a loss of network bandwidth availability results in a degradation in smoothness of the clip, not a modification of the rate at which recorded events in the clip unfold.

In addition, Chui does not teach or suggest the limitations of Appellants' independent claims 8, 18 and 28 directed to selecting a next frame for preloading by skipping at least one frame in the clip's frame sequence in response to an indication of a data transfer rate of a network, preloading a frame from a frame source into a frame queue in a memory means, displaying a preloaded frame at its correct time based on the frame rate in order to maintain timing integrity of the clip, processing elapsed real time since the clip started playing with a frame timing parameter, and updating the number of frames to skip in response to the processing of elapsed real time.

Instead, Chui describes skipping frames in response to a user control interface that allows interactive control of the display of the video sequence, namely the rapid jumping back to a previous frame, as well as the rapid skipping of frames in the forward direction, during decompression and display. In response to this user control interface, a decompressor 20 in Chui interrogates field 76 of a frame 70 in the video sequence to determine if the processing capacity of decompressor 20 and its display system 26 is such that every frame in the sequence cannot be decompressed and displayed in real time during the jumping back or skipping forward. Specifically, field 76 is a two-byte field of integer type that indicates the complexity of the image contained within frame 70, by specification of

compression ratio, quality index, or a user-defined specification of the image. If the decompressor 20 determines, from its interrogation of field 76, that every frame in the sequence cannot be decompressed and displayed in real time during the jumping back or skipping forward, the decompressor 20 skips to the next or previous frame 70 in the sequence indicated by the contents of field 75 in frame 70.

Thus, Chui skips frames based on an indication of image complexity contained within a frame, but not in response to an indication of the data transfer rate of a network, as recited in Appellants' claims. Indeed, nothing in Chui relates Appellants' claimed invention directed to skipping frames on the basis of network bandwidth availability.

Moreover, the assertion in the Examiner's Answer that the limitation "so that a loss of the network bandwidth availability results in degradation in smoothness of the clip, not a modification of the rate at which recorded events in the clip unfold," recites an intended use and does not provide a structure to achieve the intended use, is erroneous. Moreover, Appellants' attorney submits that, based on the above, Chui is not capable of performing the alleged intended use. Instead, this limitation describes a structural difference between Appellants' claimed invention and Chui, and thus patentably distinguishes Appellants' claimed invention from Chui.

As a result, Chui does not teach or suggest all the elements of Appellants' claimed invention. Moreover, the various elements of Appellants' claimed invention together provide operational advantages over Chui. In addition, Appellants' invention solves problems not recognized by Chui.

Thus, Appellants' attorney submit that independent claims 1, 8, 11, 18, 21 and 28 are allowable over Chui. Further, dependent claims 2-7, 9-10, 12-17, 19-20, 22-27, 29 and 30 are submitted to be allowable over Chui in the same manner, because they are dependent on independent claims 1, 8, 11, 18, 21 and 28, respectively, and thus contain all the limitations of the independent claims. In addition, dependent claims 2-7, 9-10, 12-17, 19-20, 22-27, 29 and 30 recite additional novel elements not shown by Chui.

2. Claims 2, 12 and 22

Claims 2, 12 and 22 recite that the indication of the data transfer rate is provided by a comparison of the relative position of an input and an output pointer in a queue of frames that have been selected for display. The Examiner's Answer now asserts that these claims are taught by Chui at col. 28, lines 22-37. Appellant's attorney disagrees, and submits that the cited portions of the reference, which are set forth below, do not teach or suggest the limitations of these claims:

Chui: Col. 28, lines 22-37

> Fields 74 and 75 then follow in frame 70 according to this example, to facilitate control of the display of the video sequence containing frame 70. Field 74 is a four-byte field of long integer type which contains the address at which the previous frame in the sequence begins, enabling rapid jumping back to the previous frame as desired. As will be described hereinbelow, a user control interface may be provided with decompressor system 20 to allow interactive control of the display of the video sequence, in which case field 74 will facilitate the skipping and selection of individual frames in reverse order. Similarly, field 75 is a four-byte field of long integer type which contains the address of the next frame in the sequence, allowing rapid skipping of frames 70 in the forward direction during decompression and display.

Appellants' attorney respectfully submits that the above portions of Chui merely describe fields in the frame that contain the addresses of the previous frame in the sequence and the next frame in the sequence, in order to allow frames to be skipped in sequence. However, nothing in the above portions of Chui teach or suggest a comparison of the relative position of an input and an output pointer in a queue of frames to provide an indication of the data transfer rate.

3. Claims 3, 13 and 23

Claims 3, 13 and 23 recite that the frame source includes means for storing pre-rendered image frames. Appellant's attorney submits that these claims stand or fall with claims 1, 11 and 21, respectively.

4. Claims 4, 14 and 24

Claims 4, 14 and 24 recite that the frames are skipped in response to a prediction of a network data transfer rate. The Office Action rejects these claims on the basis of the arguments set forth above. Appellant's attorney disagrees, and submits that the cited portions of the reference do not teach or suggest the limitations of these claims. Nothing in the above portions of Chui teach or suggest that the frames are skipped in response to a prediction of a network data transfer rate.

5. Claims 5, 15 and 25

Claims 5, 15 and 25 recite that frames are prefetched into a frame queue prior to their due time. Appellant's attorney submits that these claims stand or fall with claims 1, 11 and 21, respectively.

6. Claims 6, 16 and 26

Claims 6, 16 and 26 recite that a frame skip rate is defined by a user. Appellant's attorney submits that these claims stand or fall with claims 1, 11 and 21, respectively.

7. Claims 7, 17 and 27

Claims 7, 17 and 27 recite that a frame is selected for display by processing its due time with elapsed real time since playback started. The Office Action rejects these claims on the basis of Chui at col. 29, lines 57-63. Appellant's attorney disagrees, and submits that the cited portions of the reference, which are set forth below, do not teach or suggest the limitations of these claims:

> Chui: Col. 29, lines 57-63
>
> Fields 74, 75, 76 also provide interactive display capability. As field 74 indicates the address of the previous frame in the sequence, frame 70 allows the capability of backwards display of a motion picture, whether for each frame 70 in the sequence or with frames skipped as described above based on the time required for decompression and the capability of decompressor 18. In addition, the information provided by field 76 facilitates the synchronization of the display of the sequence of frames 70, and also allows for easy scaling of the time base to provide slow-motion or enhanced-speed display.

Appellants' attorney respectfully submits that the above portions of Chui merely describe the use of fields 74, 75 and 76, wherein field 74 contains the address at which the previous frame in the sequence begins, field 75 contains the address of the next frame in the sequence, and field 76 indicates the complexity of the image contained within frame 70. However, nothing in the above portions of Chui teach or suggest that a frame is selected for display by processing its due time with elapsed real time since playback started.

8. Claims 9, 19 and 29

Claims 9, 19 and 29 recite that the frame timing parameter is the due time for a frame. Appellant's attorney submits that these claims stand or fall with claims 8, 18 and 28, respectively.

9. Claims 10, 20 and 30

Claims 10, 20 and 30 recite that the instructions for the processing means are executed as multiple threads. Appellant's attorney submits that these claims stand or fall with claims 8, 18 and 28, respectively.

III. CONCLUSION

In light of the above arguments, Appellants' attorney respectfully submits that the cited references do not anticipate nor render obvious the claimed invention. More specifically, Appellants' claims recite novel physical features which patentably distinguish over any and all references under 35 U.S.C. §§ 102 and 103.

As a result, a decision by the Board of Patent Appeals and Interferences reversing the Examiner and directing allowance of the pending claims in the subject application is respectfully solicited.

Respectfully submitted,

Marc Bolduc et al.

By their attorneys,

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